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POLITE ARTS.

No. I.

MACHINE FOR STUMP ENGRAVING.

The SILVER MEDAL was presented to Mr. WM. MACLAURIN, 9 Canonbury Terrace, Islington, for his Machine for Stump Engraving. The following communication, describing his invention, has been received from Mr. Maclaurin.

SIR, 9 *Canonbury Terrace, Islington.*

WHEN I presented my invention to the notice of the Society, in the month of January last, I gave it the technical appellation of a Stump-engraving Machine, not willing, however sanguine, to advance pretensions which had not been confirmed by proof as at this time, when a far more general application might be claimed for it, merely by the exhibition of the result; I am now ready to impart to the Society the mode of operation pursued by me in the prosecution of these labours.

Agreeably to the permission granted, of making such alterations in the draught of the instrument as were expedient, without their affecting in the slightest degree the principle of the discovery, I proceed to describe it, as occupying the centre of the upper portion of Plate I.

The invention consists simply in the employment of the principle of diminution, as gained by attaching two equal movable arms, with tracing-points, to a graduated quadrangular vertical bar, which bar is suspended from an universal joint, similar to Dr. Hook's, except that the bearings are on screw-points. *a*[*] is the universal joint, *b* the bar, *c c* the two movable arms and points.

The pillar or standard *d*, with its arm *e*, are merely accessory in this instance to the support of the universal joint, &c.; and the slide-rests *f* and *g* (*g* being placed transversely upon *f*, and *f* being screwed upon the two triangular bars *h h*, which pass through the sockets *i i*, thus enabling the slide-rests to correspond in height with the required elevation of the upper tracing-arm,) are only necessary for a portion of the work which this instrument is capable of producing. *j j* are the heads of the binding screws, which arrest the bars, and prevent the rests from sliding down upon the table.

The bar *b*, being thus suspended, will necessarily swing with perfect freedom in any direction, and, if the universal joint be nicely adjusted, without shake. Moreover, the arms with the tracing-points likewise swing upon their centres, being restrained from falling towards the bar by the intervention of their respective places of rest. When motion is given to the bar by the lower tracer, as it moves upon the object designed to be reduced, the upper tracer by its means imitates that movement at a diminished rate, according to the distance that may exist between them. To aid this description, I have introduced upon the left of the machine the upper tracing-arm, for a diamond or other point, with the piece that slides upon the bar affixed. The design upon the right is the cross-shaped piece of metal that forms the centre of Dr. Hook's universal joint, a joint which I preferred for this process.

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[*] See note at the end of this paper.

To produce the tint formed of the words "society of arts," and consisting of 5408 letters, my plate prepared for etching,—and not only in this, but every instance,—is fixed firmly to the platform of the slide-rest *g* by any convenient method. The words are cut once, and once only, upon a metal plate; in this instance they occupy a parallelogram of 2⅛ inches by 5/16 of an inch, exclusive of the portions of such letters as project beyond. From the points of suspension to the lower point, which is the prime mover, the distance measured was about 15 inches; the upper or diamond point being distant from the lower about 14⅜ inches, or ⅝ of an inch from the centres of the metal cross. Having etched each letter of each word in succession, by raising the diamond from the plate previous to removing the lower point, a division is taken upon the slide-rest *g*; and this repeated, forms the column. When the column is completed, the slide-rest, with its platform and the plate, are run back to the starting-point, and a portion taken on the slide-rest *f*, when the same process is continued. In the measurements here given, I say "about," the arms having been casually deranged previous to the notation.

It will be observed, that I have not made any arrangement for lifting the diamond point, preferring what I have considered the greater accuracy and expedition resulting from raising it by means of the uplifted hand. In this way the palm of the left hand inclines against the edge of the platform, and the thumb is made use of; while the head and eye, directed downwards, control the fore-fingers and thumb of the right hand, as they retain a firm hold of the lower tracer by the help of the wire which intersects the end of it. But as it becomes indispensable that other means should be resorted to when the bar, being longer, has a wider range, I suggest that a stiff arm, carrying a pulley at each extremity, and connected with a sliding-piece, should be attached to the bar as near as possible to the tracer; it will then move with it, and the action upon the diamond, by the aid of a silken cord (which is best), will be vertical; and the cord, passing from the end of the tracer over the pulleys, will lie against the bar, similar to the haulyards against the mast of a vessel, where it might be restrained again by another pulley.

The quotation from Bacon was effected by means of tracing in a channel or groove, cut upon type, " Two-line Antique." It was set up, for the most part, word by word in a small frame, and made fast previous to working: when the word was etched, I took a portion upon the slide-rest *f*, and when the line was completed, upon rest *g*, and so repeated. This specimen was accomplished with only two alphabets, and its spaces were measured by the eye: but here I suggest that there should be a sufficiency of type channelled ready; that there should be a slide-rest below, parallel with, and under *f*; that a line at a time, with its spaces, should be set up upon it; that the two rests should be connected by wheel and pinion, corresponding with the rate of diminution previously determined. Then, let there be a starting point for the tracer, which point must, likewise, be an index always stationary; trace as much as convenient, bring the tracer back to its place, and the letter or space where you left off, to the index by means of the slide-rest (no index is necessary to it) and the upper rest *f* will have travelled in proportion. When the line is completed, shift the plate by means of the slide-rest *g*, as in the specimen, and set up another line of type.

The same result may be gained by setting up type—not the channelled type—with the spaces composing the first line, upon a frame at hand, when the diminution of that line has been fixed by etching, and the second, or required line, in correct form beneath it. Whatever be the rate of diminution, the eye may carry with sufficient correctness the distance necessary to be taken upon the rest *f*, between word and word, by noticing the position of the required letter with reference to another letter or space in the previous line, as composed upon the frame. When the second line of etching is finished, the second line of plain type on the frame is left to occupy the place and usefulness of the first, which is distributed, in order to form a third, which then becomes the required line, and so on. This plan is as practicable, although not so expeditious, as the former. But let it be remembered, that an error in a space at the commencement of a line will either spoil, or considerably mar the work, if not corrected betimes.

The quotation from Milton was effected by cutting the alphabet, with the requisite capitals, once upon a metal plate. This plate is affixed to a slide, or, if slides, one must be at right angles to and upon the other. I prefer the latter method, because the range is more compact. These letters have each a dot pierced beside them, to allow a spring-point, similar to the point of a dividing-plate, to fall into. It may be as well to state, that the bed of the lower slide, and the spring-point, are fixed firmly to the table. By shifting the slides, I can bring all the letters on the plate successively under the tracer, each occupying the place of its predecessor, and as the spring-point is stationary, it effectually restrains any motion in the slides while resting in the dot corresponding with the required character; but it is needful to move the upper plate by help of the slide-rest *f*, or the etching becomes a mass of confusion; and here I have no guide but the eye to determine the distance. When the most satisfactory is determined upon, I record it in a diagram similar to, but considerably larger than, the one exhibited above the quotation, which necessarily gives all the changes that can occur in language where the same character is used. The double corresponding alphabets are to assist the eye in its range over the squares for the notation; and if the vowel-lines were to be distinguished by red ink, it would be an improvement. The same description of table may be constructed for the capitals, if considered necessary: and here I would observe that, when once filled up, it requires no amendment, but will always remain ready for letters of the same size; and even should these be slightly diminished or increased, the proportions previously existing will remain. Should equal spaces be preferred, which is possible in arranging verse, it is only requisite to add some common number to the differential one found in the table for the last and first letter of the two words.

The rose and vases were outlined from embossed card; the words " Society of Arts," from a plate having the down strokes formed by double lines: the only advantage in this instance is, that of enabling an individual to execute a ruder description of writing engraving, which, without the instrument, he could not have produced at all; were there many copies in requisition, it might succeed. The wreaths were traced from the reverse of the Society's medal. I have thus, Sir, noticed in succession the specimens as they were respectively etched and bitten in. The representation of the machine, with the medallion heads, are likewise its production ; nor do I hesitate to advance an opinion, grounded upon the results thus finally obtained, that with both arms equal, it is, without alteration, as when first presented to the notice of the Society, a correct instrument. The drawing was made upon a piece of slate, and then scratched in with an etching-needle ; but I am not inclined to favour this medium very much, it so rapidly destroys the fineness of the tracing-point. Previous to tracing the medallion heads, I exchanged the steel point for an ivory one,—both they and the drawing of the machine are reduced one half.

It would have been far more satisfactory to myself had I been able, during the short space that has elapsed since the execution of these last portions of the plate, to have discovered some more definite rule than I at present am acquainted with, for gaining rapidly a correct reduction; but the time has been too fully occupied. My plan at all times is, to experiment upon some simple axiom, and then to find a rule for the result. The object in these experiments was to find opposite extremes,—a plan, where the nature of the subject under experiment does not prevent it, which I have not known to fail. Thus any casual arrangement of the tracing-arms will, from a circle in the progress of diminution, give an ellipse, and a straight line, an elliptical curve. I sought to cross the ellipse with another at right angles, and to invert another elliptical curve upon the former, which curve was the given result of the straight line. Having succeeded, it was evident that, as these ellipses had one common centre, so the arms and plate were capable of an adjustment by which these eccentricities could not take place; but so fine is this adjustment required to be, that even the changing of the trial-plate for another of the same thickness, but with a greater inequality of surface (as is the case with the steel plate upon which the specimens were etched) is sufficient to produce a slight variation. The machine I work at, of my own construction, hastily and rudely put together, forbids my giving the correct data most desirable in this instance, not knowing, however accurate they might seem to be, whether the effect would be attributed to the proper cause; notwithstanding, I impart to you the experience I possess.

The following are data for further investigation. Vertical bar, twenty-two inches; tracing-points, their distance from the bar, five inches; the angle of the tracing-arms, of which the bar forms the base, five degrees; and, when the lower tracing-point is at the further extremity of the drawing, the bar to be then vertical; consequently, the movement will be from the centre of suspension, not round it. I think the plan of increasing the length of the bar according to circumstances, and preserving equal arms, with this subsequent arrangement of them, will be found preferable to lengthening the lower arm, which considerably increases the vibration. And when the reduction of one half only, together with the combined incorrectness of both surfaces, namely, that of the prepared plate and of the slate from which the transfer was made, are taken into consideration, the result may be considered favourable. The tremulous appearance of the rings round the medallion arises from the conical tracing-point not having free space to follow the course of the rings upon the medal without interfering with the work in relief upon the frieze.

As it would be inconvenient to use the machine in its present form for large plates, I suggest that the machine should be movable above the plate; and, for the lettering of maps and detached portions of work, a very simple modification would suffice. I here invert the tracers, as mentioned in my first communication to the Society, affixing them to the ends of the vertical bar, and passing that bar *through* a universal joint: the joint has a stiff arm connected with a sliding-piece, which permits it to move when necessary upon a standard with a loaded foot. The tracing-points in this instrument need not be displaced; for, by disconnecting the bar and joint at the same time that the binding-screw of the sliding-piece upon the standard is loosened, the universal joint can be shifted higher or lower upon the bar, which acts as a lever upon its fulcrum. This is the construction of the joint: a sliding-piece upon the bar suspending a square or circular frame of metal at one of its diameters, is again suspended at its transverse diameter, by the stiff arm that is made to slide upon the standard, which standard must likewise have an arm, with a small skeleton table, for lightness, connected with its head, for the purpose of supporting the channelled type, or other original, to be brought under the upper tracer, which is here the prime mover, and by which the copy is transmitted. The standard must be placed upon a plank, having at each end a narrow foot; this will leave sufficient vacuity to prevent injury to the prepared plate. By connecting this latter bar and joint with another similar to it, or with the one represented in the engraving inverted, they would form what I should call "my compound machine;" the tracing-point would then resume its place again upon the table, and the reduction would finally be transmitted to the same level.

I have now to notice the circumstance of the medallion heads looking the reverse of their originals on the medal: this would render the instrument a failure as respects engravers, where a copy, correct not only in reduction but likewise in aspect, was required. To obviate this, let the vertical bar become a horizontal one, and the tracing-arms vertical: the standard will then be at right angles to the bar, while supporting it at one end, if the joint represented in the engraving be used where the reducing or etching-point is made to slide; but, if the joint with the bar passing through it be preferred, then the position of the standard will be as the reduction. Now, let the original, and the surface to receive the diminished subject, be placed face to face,—the aspect given will be inverse, and the printing-office completes the work by another transfer, which is similar in aspect to the original. Either of the horizontal bars can be so counterpoised by weights as to prevent any unpleasantness in the working of them.

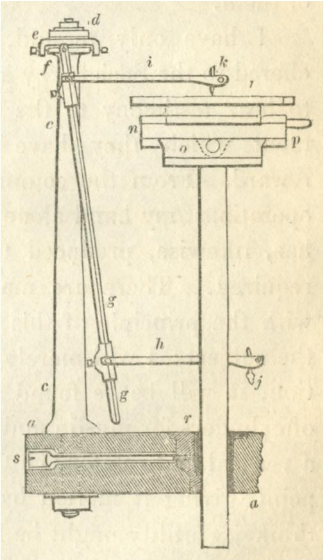
I have only to add, that these specimens are not offered to the Society, by any means, as perfect; but only to bear testimony to the truth and power of the instrument which they have already adjudged worthy of reward. From the commencement to the close of these operations, my hand alone has been upon the plate; and has, likewise, produced the originals where such were required. There are many other operations connected with the principle of this invention, at present foreign to the subject: I will merely state, that under this modification, it will be be found advantageous to the engravers of cylinders for muslin and cotton goods; and by inserting a vertical and rotatory cutter in the place of the diamond-point, giving it motion by aid of a small band-wheel, I think its utility might be increased.

In reviewing this description, I am led to think that a still further application of this principle might be introduced in the operation of etching from channelled type, as exemplified in the quotation from Bacon, by substituting another vertical arm and joint, to act upon two slides, independent of the screws and gearing.

I am, Sir, &c. &c.

A. Aikin, Esq. William Maclaurin.
Secretary, &c. &c.

*** It has been thought desirable, for the better understanding Mr. Maclaurin's description of his instrument, to subjoin the accompanying diagram, which represents the machine at right angles to that shewn in Plate I.



a a is the base, or table, which supports the whole superstructure ; *c c* is the standard (marked *d* in the engraving) which carries the graduated bar *g g* (*b* in the engraving), suspended from the arm *d* (*g* in the engraving) by means of the universal joint *e f* (*a* in the engraving) ; *h i* are the two arms, the lower one carrying the tracing-point *j*, and the upper the etching-point *k* (these parts are indicated in the engraving by the letters *c c*); *l* is the table that supports the plate to be etched; *n* the slide-rest (*f* in the engraving) that moves the table on the bed *o* in the direction of its length, and *p* the head of the screw which actuates the other slide-rest (*g* in the engraving), by means of which the table is moved in the direction of its breadth; *r* is one of the triangular sockets (*i* in the engraving) in which the triangular uprights (*h h* in the engraving) slide; and *s* (*j* in the engraving) is one of the binding-screws by means of which they may be secured at any required height.

No. II.

CRAYONS FOR DRAWING ON GLASS.

The ***Large Silver Medal*** *was presented to* ***Mr. S. B. Howlett****, of* 83½ *Pall Mall, Chief Military Draughtsman in the Ordnance Department, for his Crayons for Drawing on Glass.*

Mr. Howlett's perspective tracing-glass consists of a plate of clear glass fixed in a frame, and set upright on a tripod stand, so as to bring it on a level with the eye of the artist. From the top of the tripod projects horizontally a light frame, with a hole at the end, for the purpose of supporting in a vertical position a pin, at the top of which